"CONJUNCTIVE USE OF SURFACE AND GROUNDWATER UNDER CLIMATE CHANGE CONDITIONS"

Research Proposal submitted to

Swami Ramanand Teerth Marathwada University, Nanded

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In

Civil Engineering

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INTRODUCTION

Water in every form is a very valuable resource to sustain human life and maintain each ecosystem on earth. Surface as well as groundwater find their application for generation of hydropower, irrigation, drinking and industrial purposes. But due to rapid industrialization and ever increasing population the water requirements are rising. Major and decisive steps need to be taken to avoid exceeding of the water requirements to the water available

The national water policy, 2012 states that water is scant natural resource which is essential to maintain life, security of food, livelihood and stable progress. India compromises of 18 % of entire population of the world. However, it merely possesses 4% of total water resources which can be replenished and 2.4% of land of total area. These are additional restrictions on exploitable amount of water leading to irregular allocation over space and time.

The inter-sectoral competition for water, combined with environmental and social concerns, has made the job even more difficult for the water resource managers. The recent trend of global climate change has also added to the uncertainties in the irrigation sector. It is, therefore, extremely necessary that the available water resources are utilized in a systematic and planned manner. But, in most cases, providing sufficient quantities of water to the crop all-round the year, from a single source in a planned manner, is not possible. This is because both surface water and groundwater have certain limitations regarding their application in irrigation

Therefore, Conjunctive use planning and management is essential to achieve maximum returns from the cropping activities of any area in addition to solving problems like water table depletion/water logging.

Another major concern is climate change which can result in significant impacts on regional and global surface water and groundwater resources. It is helpful to reduce vulnerabilities of water supply systems and mitigate the water supply stress in responding to climate change. Hence it is necessary to develop more effective management and adaptation strategies for conjunctive water resources use in facing climate change under complex uncertainties.

SIGNIFICANCE OF STUDY

Marathwada region of Maharashtra lies at the leeward side of Sahyadri ranges and therefore the rainfall is scarce in this region. This region faces extreme water scarcity and has faced droughts in several past years. So it is very important to manage the groundwater as well as surface water sources. Development and utilization of surface and groundwater in isolation has adversely affected the groundwater balance. Also due to over exploitation of groundwater in some regions, the water levels have gone down while the surface water is function of

unpredictable rainfall. Overall there is extreme deficit of water and the demand is higher than the availability of water.

The conjunctive use of groundwater and surface-water resources is necessary because the availability of one source of water over time and space may not be sufficient to fulfill all irrigation requirements (Tyagi et al. 2005; Harmancioglu et al. 2013).

Therefore, in such water scarce areas conjunctive use of groundwater and surface water becomes indispensable where one can use these both sources complementary to one another. One source can be used when there is deficit of other source and vice versa.

RESEARCH GAP

Optimization models and methods are effective tools for allocating water resources and providing decision supports. A number of optimization management models have been proposed for conjunctive use of surface water and groundwater. These models are mainly for the purposes of cropping patterns planning and irrigation water management.

Optimization methods and models for conjunctive use surface water and groundwater management do not consider the effects and impacts of future climate change. This lack hinders their applicability to generate effective water management strategies in future changing climatic conditions since climate change is inevitable.

OBJECTIVES

i. To assess the available surface and groundwater resources for irrigation in the study area
ii. To study groundwater recharge to develop water balance model in the study area
iii. To develop a water management model to optimize water resources allocation under climate change

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EXPECTED OUTCOME

An new water allocation policy derived from the optimized model of conjunctive use of surface and groundwater. This policy will also be considering the climatic conditions.

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